

Appl. No.: 09/289,327  
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**Amendments to the Claims:**

This listing of claims filed October 7, 2004 will replace all prior versions, and listing, of claims in the application:

**IN THE CLAIMS:**

1(canceled). A polarization converter for use with a light source the generates a light beam having at least two light components, comprising an optics array capable of separating said light beam into at least one light component polarized differently than another light component, wherein said one light component and said another light component are within a single light beam, and wherein said one light component has a different color than said another light component, and wherein said light source defines an initial étendue and said optics array has an étendue substantially greater than one times said initial étendue.

2(canceled). The converter of claim 1 wherein said light source defines an initial étendue and said optics array has an étendue no more than four times greater than said initial étendue.

3(canceled). The converter of claim 2 wherein said optics array has an étendue no more the 3.5 times greater than said initial étendue.

4(canceled). The converter of claim 2 wherein said optics array has an étendue no more than two times greater than said initial étendue.

5(canceled). The converter of claim 1 wherein said optics array has at least one dichroic filter.

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6(canceled). The converter of claim 1 wherein substantially all of said light beam is transmitted through said optics array.

7(canceled). The converter of claim 5 wherein said dichroic filter is sandwiched between two quarter waveplates.

8(canceled). The converter of claim 1 wherein said optics array has a first dichroic filter and a second dichroic filter complimentary to said first dichroic filter.

9(canceled). The converter of claim 8 wherein each dichroic filter is sandwiched between two quarter waveplates.

10(canceled). The converter of claim 8 wherein said optics array includes a polarizing beam splitter and said light beam passes through said beam splitter before passing through one of said dichroic filters.

11(canceled). The converter of claim 10 wherein said optics array further includes another polarizing beam splitter.

12(canceled). The converter of claim 9 wherein said optics array further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

13(canceled). The converter of claim 12 wherein said optics array further includes a halfwave plate between one of said polarizing beam splitters and an illuminated object.

14(canceled). The converter of claim 1, further comprising a plurality of light input ports.

15(canceled). The converter of claim 9 wherein said optics array further includes a first polarizing beam splitter between said light source and said first dichroic filter, and a second

polarizing beam splitter between said first polarizing beam splitter and said second dichroic filter.

16(canceled). The converter of claim 9 wherein said optics array further includes a stack of polarizing beam splitters, said dichroic filters are adjacent to one another and are located on one side of said stack of beam splitters, and said optics array further comprising a plurality of quarter waveplate and mirror stacks located on the other side of said stack of polarizing beam splitters, said dichroic filters and said quarter waveplate and mirror stacks arranged so that at least a portion of one of said dichroic filters opposes a portion of one of said quarter waveplate and mirror stacks, and at least a portion of another of said dichroic filters does not oppose any of said quarter wave plate and mirror stacks.

17(canceled). The converter of claim 1 wherein said light source produces light having three light components and said optics array separates said light so that two of said light components have the same polarization, which is different than the polarization of the third light component.

18(canceled). The converter of claim 17 wherein said three light components are blue, green and red and said blue component and said green component have the same polarization, which is different than the polarization of said red component.

19(canceled). The converter of claim 1 wherein said optics array separates said two light components so that one of said components has s-polarization and the other light component has p-polarization.

20(canceled). A method of projecting light comprising:

- (a) producing a light beam that is nonpolarized and has at least two light components;

- (b) separating said light beam into at least one light component polarized differently than another light component, wherein substantially all of said light beam is transmitted when said polarization occurs, wherein said one light component and said another light component are within a single said light beam, and wherein said one light component has a different color than said another light component, and wherein said light source defines an initial étendue and said optics array has an étendue substantially greater than one times said initial étendue;
- (c) receiving said light beam as a result of step (b) and providing light-component-specific images; and
- (d) projecting said light-component-specific images through a projection lens.

21(canceled). The method of claim 20 wherein said light beam is first separated into a first polarized component having a first polarization and a second polarized component having a second polarization.

22(canceled). The method of claim 21, further comprising the step of separating the first polarized component into a first light component and a second light component and changing the polarization of the first light component, and the step of separating the second polarized component spectrally into said first light component and said second light component and changing the polarization of the second light component, so that said first light component has said second polarization, and said second light component has said first polarization.

23(canceled). The method of claim 20 wherein said light beam is comprised of red component, a blue component and a green component, and said light is separated so that said blue component and said green component have the same polarization, which is different than the polarization of said red component.

24(canceled). The method of claim 20 wherein said light beam is separated so that one of said light components has s-polarization and the other light component has p-polarization.

25(canceled). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having a least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components and said one of said light components has a color that is different than said another of said light components;
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, and LCD panel generating a light-component-specific image associated with one of said light components; and
- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCD's.

26(canceled). The system of claim 25 wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

27(canceled). The system of claim 25 wherein said light source includes a polarization converter for pre-filtering said light beam.

28(canceled). The system of claim 25 wherein said polarizing beam splitters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are arranged in a substantially straight line in said projection system, and wherein said

dichroic filters are normal to said polarizing beam splitters and arranged to intersect adjacent a mid-point of said substantially straight lines.

29(canceled). The system of claim 28 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on a LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

30(canceled). The system of claim 28 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-transmitting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

31(canceled). The system of claim 25 wherein said light source includes a lamp for generating said light beam and a pre-filtering illumination mechanism located between said lamp and said projection system for pre-filtering said light beam to provide a red p-polarized light component to said projection system, wherein said pre-filtering illuminating mechanism includes:

a red-transmitting dichroic filter, a pair of polarizing beam splitters, a pair of light absorbing stops, a half-wave plate, and a red-reflecting dichroic filter;

wherein said light beam impinges said red-transmitting dichroic filter, wherein said light beam is split into a reflected red light component and transmitted green light and blue light components; said reflected green and blue light components impinge on a polarizing beam

splitter, which reflects a green s-polarized light component and said blue light component, wherein said green s-polarized light component and said blue light component impinge said red-reflecting dichroic filter, which transmits said green s-polarized light component and a blue s-polarized light component to said projection system; and

wherein said reflected red light component impinges another polarizing beam splitter, which transmits a red s-polarized light component through said half-wave plate, which changes said red s-polarized light component to a red p-polarized light component, which red p-polarized light component impinges said red-reflecting dichroic filter and is reflected to said projection system.

32(canceled). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having at least three light components, wherein one of said light components is p-polarized and two of said light components are s-polarized;
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects one of said light components and transmits another of said light components and LCD panels, each LCD panel generating a light-component-specific image associated with each light component, wherein said polarizing beam splitters and said dichroic filters are arranged in a substantially x-shaped configuration, wherein said dichroic filters are normal to said polarizing beam splitters and arranged to intersect adjacent an edge thereof; and
- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs.

33(canceled). The system of claim 32 wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam.

34(canceled). The system of claim 32 wherein said light source includes a polarization converter for pre-filtering said light beam.

35(canceled). The system of claim 32 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

36(canceled). The system of claim 32 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

37(canceled). The system of claim 32 wherein said light source includes a lamp for generating said light beam and a pre-filtering illumination mechanism located between said lamp and said projection system from pre-filtering said light beam to provide a red p-polarized light component, a green s-polarized light component and a blue s-polarized light component to said projection system, wherein said pre-filtering illumination mechanism includes:

a red-transmitting dichroic filter, a pair of polarizing beam splitters, a pair of light absorbing stops, a half-wave plate, and a red-reflecting dichroic filter;

wherein said light beam impinges said red-transmitting dichroic filter, wherein said light beam is split into a reflected red light component and transmitted green light and blue light components; said reflected green and blue light components impinge on a polarizing beam



splitter, which reflects a green s-polarized light component and said blue light component, wherein said green s-polarized light component and said blue light component impinge said red-reflecting dichroic filter, which transmits said green s- polarized light component and a blue s- polarized light component to said projection system; and

wherein said reflected red light component impinges another polarizing beam splitter, which transmits a red s-polarized light component through said half-wave plate, which changes said red s-polarized light component to a red p-polarized light component, which red p-polarized light component impinges said red-reflecting dichroic filter and is reflected to said projection system.

38(canceled). A projection display system using polarized light, comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components and said one of said light components has a color that is different than said another of said light components;
- (b) a projection system having a plurality of polarized light modulators, each modulator generating a light-component-specific image associated with one of said light components; and
- (c) a projection lens for projecting an image combined from the light-component-specific images from said modulators.

39(canceled). The system of claim 38 wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

40(canceled). The system of claim 38 wherein said light source includes a polarization converter.

41(canceled). The system of claim 40 wherein said polarization converter transmits substantially all of said light beam.

42(canceled). The system of claim 40 wherein said light source has a lamp defining an initial étendue, and said polarization converter has an étendue no greater than twice said initial étendue.

43(canceled). The system of claim 40 wherein said polarization converter has a first dichroic filter and a second filter complimentary to said first dichroic filter, and wherein each dichroic filter is sandwiched between two quarter waveplates.

44(canceled). The system of claim 40 wherein said polarization converter includes two polarizing beam splitters.

45(canceled). The system of claim 40 wherein said polarization converter further comprises a plurality of light input ports.

46(canceled). The system of claim 43 wherein said polarization converter further includes at least two polarizing beam splitters.

47(canceled). The system of claim 40 wherein said light source produces light having three light components and said polarization converter separates said light so that two of said light components have the same polarization, which is different than the polarization of the third light component.

48(canceled). The system of claim 47 wherein said three light components are blue, green and red and said blue component and said green component have the same polarization, which is different than the polarization of said red component.

49(canceled). The system of claim 40 wherein said polarization converter separates said two light components so that one of said light components has s-polarization and another of said light components has p-polarization.

50(canceled). A projection display system using polarized light comprising:

- (a) a polarization converter for use with a light source that provides a light beam having a least two components where at least one light component is polarized differently than another light component, wherein said one light component and said another light component are within a single said light beam, and wherein said one light component has a different color than said another light component;
- (b) a projection system that receives said differently polarized light and provides light-component-specific images; and
- (c) a projection lens that projects an image combined from the light-component-specific images.

51(canceled). The system of claim 50 wherein said light source defines an initial étendue and said polarization converter has an étendue no more than four times greater than said initial étendue.

52(canceled). The system of claim 51 wherein said polarization converter has an étendue no more than 3.5 times greater than said initial étendue.

53(canceled). The system of claim 51 wherein said polarization converter has an étendue no more than two times greater than said initial étendue.

54(canceled). The system of claim 50 wherein said polarization converter has at least one dichroic filter.

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55(canceled). The system of claim 50 wherein substantially all of said light beam is transmitted through said polarization converter.

56(canceled). The system of claim 54 wherein said dichroic filter is sandwiched between two quarter waveplates.

57(canceled). The system of claim 50 wherein said polarization converter has a first dichroic filter and a second dichroic filter complimentary to said first dichroic filter.

58(canceled). The system of claim 57 wherein each dichroic filter is sandwiched between two quarter waveplates.

59(canceled). The system of claim 57 wherein said polarization converter includes a polarizing beam splitter and said light beam passes through said beam splitter before passing through one of said dichroic filters.

60(canceled). The system of claim 59 wherein said polarization converter further includes another polarizing beam splitter.

61(canceled). The system of claim 58 wherein said polarization converter further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

62(canceled). The system of claim 61 wherein said polarization converter further includes a halfwave plate between one of said polarizing beam splitters and an illuminated object.

63(canceled). The system of claim 50, further comprising a plurality of light input ports.

64(canceled). The system of claim 58 wherein said polarization converter further includes a first polarizing beam splitter between said light source and said first dichroic filter, and a second polarizing beam splitter between said first polarizing beam splitter and said second dichroic filter.

65(canceled). The system of claim 58 wherein said polarization converter further includes a stack of polarizing beam splitters, said dichroic filters are adjacent to one another and are located on one side of said stack of beam splitters, and said polarization converter further comprising a plurality of quarter waveplate and mirror stacks located on the other side of said stack of polarizing beam splitters, said dichroic filters and said quarter waveplate and mirror stacks arranged so that at least a portion of one of said dichroic filters opposes a portion of one of said quarter waveplate and mirror stacks, and at least a portion of another of said dichroic filters does not oppose any of said quarter wave plate and mirror stacks.

66(canceled). The system of claim 50 wherein said light source produces light having three light components and said polarization converter separates said light so that two of said light components have the same polarization, which is different than the polarization of the third light component.

67(canceled). The system of claim 66 wherein said three light components are blue, green, and red and said blue component and said green component have the same polarization, which is different than the polarization of said red component.

68(canceled). The system of claim 50 wherein said polarization converter separates said two light components so that one of said components has s-polarization and the other light component has p-polarization.

69(canceled). A method of converting light comprising:

- (a) producing a light beam of generally white light that is nonpolarized and has at least two light components;
- (b) separating said generally white light beam into at least one light component polarized differently than another light component, wherein substantially all of said generally white light beam is transmitted as a single beam, wherein said one light component and said another light component are within a single said light beam, and said one light component has a different color than said another light component; and
- (c) separating said single beam into at least two light beams, where the first beam includes light having a first polarization and the second beam includes light having a second polarization, and providing light-component-specific images.

70(canceled). The method of claim 69 wherein said light beam is first separated into a first polarized component having a first polarization and a second polarized component having a second polarization.

71(canceled). The method of claim 70, further comprising the step of separating the first polarized component into a first light component and a second light component and changing the polarization of the first light component, and the step of separating the second polarized component spectrally into said first light component and said second light component and changing the polarization of the second light component, so that said first light component has said second polarization, and said second light component has said first polarization.

72(canceled). The method of claim 69 wherein said light beam is comprised of a red component, a blue component and a green component, and said light is separated so that said blue component and said green component have the same polarization, which is different than the polarization of said red component.

73(canceled). The method of claim 69 wherein said light beam is separated so that one of said light components has s-polarization and the other light component has p-polarization.

74(canceled). A projection display system using polarized light comprising:

- (a) a light source for generating a generally white light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components, and said at least two components are provided to a projection system as a single beam, wherein the one light component and the other light component are within a single light beam, and said one light component has a different color than said other light component;
- (b) said projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, each LCD panel generating a light-component-specific image associated with one of said light components; and
- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs.

75(canceled). The system of claim 74 wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering and light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

76(canceled). The system of claim 74 wherein said light source includes a polarization converter for pre-filtering said light beam.

77(canceled). The system of claim 74 wherein said polarizing beam splitters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are normal to said polarizing beam splitters and arranged to intersect adjacent a mid-point of said substantially straight lines.

78(canceled). The system of claim 77 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

79(canceled). The system of claim 77 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on a LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-transmitting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

80(canceled). The system of claim 74 wherein said light source includes a lamp for generating said light beam and a pre-filtering illumination mechanism located between said lamp and said projection system for pre-filtering and said light beam to provide a red p-polarized light component to said projection system, wherein said pre-filtering illuminating mechanism includes:

a red-transmitting dichroic filter, a pair of polarizing beam splitters, a pair of light absorbing stops, a half-wave plate, and red-reflecting dichroic filter;



wherein said light beam impinges on red-transmitting dichroic filter, wherein said light beam is split into a reflected red light component and transmitted green light and blue light components; said reflected green and blue light components impinge on a polarizing beam splitter, which reflects a green s-polarized light component and said blue light component, wherein said green s-polarized light component and said blue light component impinge said red-reflecting dichroic filter, which transmits said green s-polarized light component and a blue s-polarized light component to said projection system; and

wherein said reflected red light component impinges another polarizing beam splitter, which transmits a red-s-polarized light component through said half-wave plate, which changes said red s-polarized light component to a red p-polarized light component, which red p-polarized light component impinges said red-reflecting dichroic filter and is reflected to said projection system.

81(canceled). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having at least three light components, wherein one of said light components is s-polarized and two of said light components are p-polarized.
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects one of said light components and transmits another of said light components and LCD panels, each LCD panel generating a light-component-specific image associated with each light component, wherein said polarizing beam splitters and said dichroic filters are arranged in a substantially X-shaped configuration, wherein said dichroic filters are normal to said polarizing beam splitters and arranged to intersect adjacent an edge thereof; and
- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs.

82(canceled). The system of claim 81 wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam.

83(canceled). The system of claim 81 wherein said light source includes a polarization converter for pre-filtering said light beam.

84(canceled). The system of claim 81 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

85(canceled). The system of claim 81 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

86(canceled). A projection display system using polarized light, comprising:

- (a) a light source for generating a generally white light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components, and said at least two light components are provided to a projection system as a single beam;

- (b) said projection system having a plurality of polarized light modulators, each modulator generating a light-component-specific image associated with one of said light components; and
- (c) a projection lens for projecting an image combined from the light-component-specific images from said modulators.

87(canceled). The system of claim 86 wherein said light source includes a lamp and filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

88(canceled). The system of claim 86 wherein said light source includes a polarization converter.

89(canceled). The system of claim 88 wherein said polarization converter transmits substantially all of said light beam.

90(canceled). The system of claim 88 wherein said light source has a lamp defining an initial étendue, and said polarization converter has an étendue no greater than twice said initial étendue.

91(canceled). The system of claim 88 wherein said polarization converter has a first dichroic filter and a second filter complimentary to said first dichroic filter, and wherein each dichroic filter is sandwiched between two quarter wave plates.

92(canceled). The system of claim 88 wherein said polarization converter includes two polarizing beam splitters.

93(canceled). The system of claim 88 wherein said polarization converter further comprises a plurality of light input ports.

94(canceled). The system of claim 91 wherein said polarization converter further includes at least two polarizing beam splitter.

95(canceled). The system of claim 88 wherein said light source produces light having three light components and said polarization converter separates said light so that two of said light components have the same polarization, which is different than the polarization of the third light component.

96(canceled). The system of claim 95 wherein said three light components are blue, green and red and said blue component and said green component have the same polarization, which is different than the polarization of said red component.

97(canceled). The system of claim 88 wherein said polarization converter separates said two light components so that one of said light components has s-polarization and another of said light components has p-polarization.

98(canceled). A polarization converter for use with a light source that generates a light beam having at least two light components, comprising an optics array capable of separating said light beam into at least one light component polarized differently than another light component, wherein said one light component and said another light component are within a single said light beam and said one light component has a different color than said another light component, wherein said optics array has a first dichroic filter and a second dichroic filter complimentary to said first dichroic filter, wherein said optics array includes a polarizing beam splitter and said light beam passes through said beam splitter before passing through one of said dichroic filters.

99(canceled). The converter of claim 98 wherein said optics array further includes another polarizing beam splitter.

100(canceled). The converter of claim 98 wherein said optics array further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

101(canceled). The converter of claim 100 wherein said optics array further includes another polarizing beam splitter.

102(canceled). The converter of claim 99 wherein said optics array further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

103(canceled). The converter of claim 102 wherein said optics array further includes a halfwave plate between one of said polarizing beam splitters and an illuminated object.

104(canceled). The converter of claim 99 wherein said optics array further includes a first polarizing beam splitter between said light source and said first dichroic filter, and a second polarizing beam splitter between said first polarizing beam splitter and said second dichroic filter.

105(canceled). The converter of claim 99 wherein said optics array further includes a stack of polarizing beam splitters, said dichroic filters are adjacent to one another and are located on one side of said stack of beam splitters, and said optics array further comprising a plurality of quarter waveplate and mirror stacks located on the other side of said stack of polarizing beam splitters, and said dichroic filters and said quarter waveplate and mirror stacks arranged so that at least a portion of one of said dichroic filters opposes a portion of one of said quarter waveplate and mirror stacks, and at least a portion of another of said dichroic filters does not oppose any of said quarter wave plate and mirror stacks.

106(canceled). A method for converting light comprising:

- (a) producing a light beam that is nonpolarized and has at least two light components;
- (b) separating said light beam into at least one light component polarized differently than another light component said one light component having a color that is different than said another light component, wherein substantially all of said light beam is transmitted;
- (c) wherein said light beam is first separated into a first polarized component having a first polarization and a second polarized component having a second polarization; and
- (d) wherein said light source defines an initial étendue and said optics array has an étendue substantially greater than one times said initial étendue.

107(canceled). The method of claim 106, further comprising the step of separating the first polarized component into a first light component and a second light component and changing the polarization of the first light component, and the step of separating the second polarized component spectrally into said first light component and said second light component and changing the polarization of the second light component, so that said first light component has said second polarization, and said second light component has said first polarization.

108(canceled). The system of claim 106 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

109(canceled). The system of claim 106 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-transmitting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

110(canceled). The system of claim 109 wherein said polarization converter further includes at least two polarizing beam splitters.

111(canceled). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components;
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, each LCD panel generating a light-component-specific image associated with one of said light components;
- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs; and
- (d) wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

112(canceled). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components;
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, each LCD panel generating a light-component-specific image associated with one of said light components;
- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs; and
- (d) said polarizing beam splitters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are normal to said polarizing beam splitters and arranged to intersect adjacent a mid-point of said substantially straight lines.

113(canceled). The system of claim 112 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

114(canceled). The system of claim 112 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a



polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-transmitting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

115(canceled). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components;
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, each LCD panel generating a light-component-specific image associated with one of said light components;
- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs; and
- (d) wherein said light source includes a lamp for generating said light beam and a pre-filtering illumination mechanism located between said lamp and said projection system for pre-filtering said light beam to provide a red p-polarized light component to said projection system, wherein said pre-filtering illuminating mechanism includes:  
a red-transmitting dichroic filter, a pair of polarizing beam splitters, a pair of light absorbing stops, a half-wave plate, and a red-reflecting dichroic filter;

wherein said light beam impinges said red-transmitting dichroic filter, wherein said light beam is split into a reflected red light component and transmitted green light

and blue light components; said reflected green and blue light components impinge on a polarizing beam splitter, which reflects a green s-polarized light component and said blue light component, wherein said green s-polarized light component and said blue light component impinge said red-reflecting dichroic filter, which transmits said green s-polarized light component and a blue s-polarized light component to said projection system; and

wherein said reflected red light component impinges another polarizing beam splitter, which transmits a red s-polarized light component through said half-wave plate, which changes said red s-polarized light component to a red p-polarized light component, which red p-polarized light component impinges said red-reflecting dichroic filter and is reflected to said projection system.

116(canceled). A projection display system using polarized light, comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components;
- (b) a projection system having a plurality of polarized light modulators, each modulator generating a light-component-specific image associated with one of said light components;
- (c) a projection lens for projecting an image combined from the light-component-specific images from said modulators; and
- (d) wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

117(canceled). A projection display system using polarized light, comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least

one of said light components is polarized differently than another of said light components;

- (b) a projection system having a plurality of polarized light modulators, each modulator generating a light-component-specific image associated with one of said light components;
- (c) a projection lens for projecting an image combined from the light-component-specific images from said modulators; and
- (d) wherein said light source includes a polarization converter, and wherein said polarization converter has a first dichroic filter and a second filter complimentary to said first dichroic filter, and wherein each dichroic filter is sandwiched between two quarter waveplates.

118(canceled). A polarization converter for use with a light source that generates a light beam having at least two light components, comprising an optics array capable of separating said light beam into at least one light component polarized differently than another light component wherein said one light component and another light component are within a single light beam, and wherein said one light component has a different color than said another light component, and wherein said light source defines an initial étendue and said optics array has an étendue of no more than four times greater than said initial étendue.

119(canceled). The converter of claim 118 wherein said optics array has an étendue no more than 3.5 times greater than said initial étendue.

120(canceled). The converter of claim 118 wherein said optics array has an étendue no more than two times greater than said initial étendue.

121(canceled). The converter of claim 118 wherein substantially all of said light beam is transmitted through said optics array.

122(canceled). The converter of claim 118 wherein said optics array has at least one dichroic filter, and wherein said dichroic filter is sandwiched between two quarter waveplates.

123(canceled). The converter of claim 118 wherein said optics array has a first dichroic filter and a second dichroic filter complementary to said first dichroic filter.

124(canceled). The converter of claim 123 wherein each dichroic filter is sandwiched between two quarter waveplates.

125(canceled). The converter of claim 123 wherein said optics array includes a polarizing beam splitter and said light beam passes through said beam splitter before passing through one of said dichroic filters.

126(canceled). The converter of claim 125 wherein said optics array further includes another polarizing beam splitter.

127(canceled). The convert of claim 124 wherein said optics array further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

128(canceled). The converter of claim 127 wherein said optics array further includes a half waveplate between one of said polarizing beam splitters and an illuminated object.

129(canceled). The converter of claim 124 wherein said optics array further includes a first polarizing beam splitter between said light source and said first dichroic filter, and a second polarizing beam splitter between said first polarizing beam splitter and said second dichroic filter.

130(canceled). The converter of claim 124 wherein said optics array further includes a stack of polarizing beam splitters, said dichroic filters are adjacent to one another and are

located on one side of said stack of beam splitters, and said optics array further comprising a plurality of quarter waveplate and mirror stacks located on the other side of said stack of polarizing beam splitters, said dichroic filters and said quarter waveplate and mirror stacks arranged so that at least a portion of one of said dichroic filters opposes a portion of one of said quarter waveplate and mirror stacks, and at least a portion of another of said dichroic filters does not oppose any of said quarter waveplate and mirror stacks.

131(canceled). A method of converting light comprising:

- (a) producing a light beam that is nonpolarized and has at least two light components;
- (b) separating said light beam into at least one light component polarized differently than another light component, said one light component having a color that is different than said another light component, wherein substantially all of said light beam is transmitted; and
- (c) wherein said light beam is first separated into a first polarized component having a first polarization and a second polarized component having a second polarization; and wherein the first polarized component is separated into a first light component and a second light component and the polarization of said first light component is changed; and wherein said second polarized component is separated spectrally into said first light component and said second light component and the polarization of said second light component is changed, so that said first light component has said second polarization, and said second light component has said first polarization.

132(pending). A polarization converter for use with a light source the generates a light beam having at least two light components, comprising an optics array capable of separating said light beam into at least one light component polarized differently than another light

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component, wherein said one light component and said another light component are within a single light beam, and wherein said one light component has a different color than said another light component, and wherein said light source defines an initial étendue and said optics array has an étendue substantially greater than one times said initial étendue.

133(pending). The converter of claim 132 wherein said light source defines an initial étendue and said optics array has an étendue no more than four times greater than said initial étendue.

134(pending). The converter of claim 133 wherein said optics array has an étendue no more the 3.5 times greater than said initial étendue.

135(pending). The converter of claim 133 wherein said optics array has an étendue no more than two times greater than said initial étendue.

136(pending). The converter of claim 132 wherein said optics array has at least one dichroic filter.

137(canceled). The converter of claim 132 wherein substantially all of said light beam is transmitted through said optics array.

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138(canceled). The converter of claim 136 wherein said dichroic filter is sandwiched between two quarter waveplates.

139(canceled). The converter of claim 132 wherein said optics array has a first dichroic filter and a second dichroic filter complimentary to said first dichroic filter.

140(canceled). The converter of claim 139 wherein each dichroic filter is sandwiched between two quarter waveplates.

141(canceled). The converter of claim 139 wherein said optics array includes a polarizing beam splitter and said light beam passes through said beam splitter before passing through one of said dichroic filters.

142(canceled). The converter of claim 141 wherein said optics array further includes another polarizing beam splitter.

143(canceled). The converter of claim 140 wherein said optics array further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

144(canceled). The converter of claim 143 wherein said optics array further includes a halfwave plate between one of said polarizing beam splitters and an illuminated object.

145(canceled). The converter of claim 132, further comprising a plurality of light input ports.

146(canceled). The converter of claim 140 wherein said optics array further includes a first polarizing beam splitter between said light source and said first dichroic filter, and a second polarizing beam splitter between said first polarizing beam splitter and said second dichroic filter.

147(canceled). The converter of claim 140 wherein said optics array further includes a stack of polarizing beam splitters, said dichroic filters are adjacent to one another and are located on one side of said stack of beam splitters, and said optics array further comprising a plurality of quarter waveplate and mirror stacks located on the other side of said stack of polarizing beam splitters, said dichroic filters and said quarter waveplate and mirror stacks arranged so that at least a portion of one of said dichroic filters opposes a portion of one of said quarter waveplate and mirror stacks, and at least a portion of another of said dichroic filters does not oppose any of said quarter wave plate and mirror stacks.

148(pending). The converter of claim 132 wherein said light source produces light having three light components and said optics array separates said light so that two of said light components have the same polarization, which is different than the polarization of the third light component.



149(pending). The converter of claim 148 wherein said three light components are blue, green and red and said blue component and said green component have the same polarization, which is different than the polarization of said red component.

150(pending). The converter of claim 132 wherein said optics array separates said two light components so that one of said components has s-polarization and the other light component has p-polarization.

151(canceled). A method of projecting light comprising:

- (a) producing a light beam that is nonpolarized and has at least two light components;
- (b) separating said light beam into at least one light component polarized differently than another light component, wherein substantially all of said light beam is transmitted when said polarization occurs, wherein said one light component and said another light component are within a single said light beam, and wherein said one light component has a different color than said another light component, and wherein said light source defines an initial étendue and said optics array has an étendue substantially greater than one times said initial étendue;
- (c) receiving said light beam as a result of step (b) and providing light-component-specific images; and
- (d) projecting said light-component-specific images through a projection lens.

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152(canceled). The method of claim 151 wherein said light beam is first separated into a first polarized component having a first polarization and a second polarized component having a second polarization.

153(canceled). The method of claim 152, further comprising the step of separating the first polarized component into a first light component and a second light component and changing the polarization of the first light component, and the step of separating the second polarized component spectrally into said first light component and said second light component and changing the polarization of the second light component, so that said first light component has said second polarization, and said second light component has said first polarization.

154(canceled). The method of claim 151 wherein said light beam is comprised of red component, a blue component and a green component, and said light is separated so that said blue component and said green component have the same polarization, which is different than the polarization of said red component.

155(canceled). The method of claim 151 wherein said light beam is separated so that one of said light components has s-polarization and the other light component has p-polarization.

156(pending). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having a least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components and said one of said light components has a color that is different than said another of said light components;
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, and LCD panel generating a light-component-specific image associated with one of said light components; and
- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCD's.

157(pending). The system of claim 156 wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

158(pending). The system of claim 156 wherein said light source includes a polarization converter for pre-filtering said light beam.

159(canceled). The system of claim 156 wherein said polarizing beam splitters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are normal to said polarizing beam splitters and arranged to intersect adjacent a mid-point of said substantially straight lines.

160(canceled). The system of claim 159 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on a LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

161(canceled). The system of claim 158 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-transmitting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

162(pending). The system of claim 158 wherein said light source includes a lamp for generating said light beam and a pre-filtering illumination mechanism located between said lamp and said projection system for pre-filtering said light beam to provide a red p-polarized light component to said projection system, wherein said pre-filtering illuminating mechanism includes:

a red-transmitting dichroic filter, a pair of polarizing beam splitters, a pair of light absorbing stops, a half-wave plate, and a red-reflecting dichroic filter;

wherein said light beam impinges said red-transmitting dichroic filter, wherein said light beam is split into a reflected red light component and transmitted green light and blue light components; said reflected green and blue light components impinge on a polarizing beam splitter, which reflects a green s-polarized light component and said blue light component, wherein said green s-polarized light component and said blue light component impinge said red-reflecting dichroic filter, which transmits said green s-polarized light component and a blue s-polarized light component to said projection system; and

wherein said reflected red light component impinges another polarizing beam splitter, which transmits a red s-polarized light component through said half-wave plate, which changes said red s-polarized light component to a red p-polarized light component, which red p-polarized light component impinges said red-reflecting dichroic filter and is reflected to said projection system.

163(pending). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having at least three light components, wherein one of said light components is p-polarized and two of said light components are s-polarized;
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects one of said light components and transmits another of said light components and LCD panels, each LCD panel generating a light-component-specific image associated with each light component, wherein said polarizing beam splitters and said dichroic filters are arranged in a substantially x-shaped configuration, wherein said dichroic filters are normal to said polarizing beam splitters and arranged to intersect adjacent an edge thereof; and
- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs.

164(pending). The system of claim 163 wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam.

165(pending). The system of claim 163 wherein said light source includes a polarization converter for pre-filtering said light beam.

166(pending). The system of claim 163 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

167(pending). The system of claim 163 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

168(pending). The system of claim 163 wherein said light source includes a lamp for generating said light beam and a pre-filtering illumination mechanism located between said lamp and said projection system from pre-filtering said light beam to provide a red p-polarized light component, a green s-polarized light component and a blue s-polarized light component to said projection system, wherein said pre-filtering illumination mechanism includes:

a red-transmitting dichroic filter, a pair of polarizing beam splitters, a pair of light absorbing stops, a half-wave plate, and a red-reflecting dichroic filter;

wherein said light beam impinges said red-transmitting dichroic filter, wherein said light beam is split into a reflected red light component and transmitted green light and blue light components; said reflected green and blue light components impinge on a polarizing beam splitter, which reflects a green s-polarized light component and said blue light component, wherein said green s-polarized light component and said blue light component impinge said red-reflecting dichroic filter, which transmits said green s- polarized light component and a blue s- polarized light component to said projection system; and

wherein said reflected red light component impinges another polarizing beam splitter, which transmits a red s-polarized light component through said half-wave plate, which changes said red s-polarized light component to a red p-polarized light component, which red p-polarized light component impinges said red-reflecting dichroic filter and is reflected to said projection system.

169(pending). A projection display system using polarized light, comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components and said one of said light components has a color that is different than said another of said light components;



- (b) a projection system having a plurality of polarized light modulators, each modulator generating a light-component-specific image associated with one of said light components; and
- (c) a projection lens for projecting an image combined from the light-component-specific images from said modulators.

170(pending). The system of claim 169 wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

171(pending). The system of claim 169 wherein said light source includes a polarization converter.

172(canceled). The system of claim 171 wherein said polarization converter transmits substantially all of said light beam.

173(pending). The system of claim 171 wherein said light source has a lamp defining an initial étendue, and said polarization converter has an étendue no greater than twice said initial étendue.

174(canceled). The system of claim 171 wherein said polarization converter has a first dichroic filter and a second filter complimentary to said first dichroic filter, and wherein each dichroic filter is sandwiched between two quarter waveplates.

175(canceled). The system of claim 171 wherein said polarization converter includes two polarizing beam splitters.

176(canceled). The system of claim 171 wherein said polarization converter further comprises a plurality of light input ports.

177(canceled). The system of claim 174 wherein said polarization converter further includes at least two polarizing beam splitters.

178(pending). The system of claim 171 wherein said light source produces light having three light components and said polarization converter separates said light so that two of said light components have the same polarization, which is different than the polarization of the third light component.

179(pending). The system of claim 178 wherein said three light components are blue, green and red and said blue component and said green component have the same polarization, which is different than the polarization of said red component.

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180(pending). The system of claim 171 wherein said polarization converter separates said two light components so that one of said light components has s-polarization and another of said light components has p-polarization.

181(pending). A projection display system using polarized light comprising:

- (a) a polarization converter for use with a light source that provides a light beam having a least two components where at least one light component is polarized differently than another light component, wherein said one light component and said another light component are within a single said light beam, and wherein said one light component has a different color than said another light component;
- (b) a projection system that receives said differently polarized light and provides light-component-specific images; and
- (c) a projection lens that projects an image combined from the light-component-specific images.

182(pending). The system of claim 181 wherein said light source defines an initial étendue and said polarization converter has an étendue no more than four times greater than said initial étendue.

183(pending). The system of claim 182 wherein said polarization converter has an étendue no more than 3.5 times greater than said initial étendue.

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184(pending). The system of claim 182 wherein said polarization converter has an étendue no more than two times greater than said initial étendue.

185(pending). The system of claim 181 wherein said polarization converter has at least one dichroic filter.

186(canceled). The system of claim 181 wherein substantially all of said light beam is transmitted through said polarization converter.

187(canceled). The system of claim 185 wherein said dichroic filter is sandwiched between two quarter waveplates.

188(canceled). The system of claim 181 wherein said polarization converter has a first dichroic filter and a second dichroic filter complimentary to said first dichroic filter.

189(canceled). The system of claim 188 wherein each dichroic filter is sandwiched between two quarter waveplates.

190(canceled). The system of claim 188 wherein said polarization converter includes a polarizing beam splitter and said light beam passes through said beam splitter before passing through one of said dichroic filters.

191(canceled). The system of claim 190 wherein said polarization converter further includes another polarizing beam splitter.

192(canceled). The system of claim 190 wherein said polarization converter further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

193(canceled). The system of claim 192 wherein said polarization converter further includes a halfwave plate between one of said polarizing beam splitters and an illuminated object.

194(canceled). The system of claim 181, further comprising a plurality of light input ports.

195(canceled). The system of claim 189 wherein said polarization converter further includes a first polarizing beam splitter between said light source and said first dichroic filter, and a second polarizing beam splitter between said first polarizing beam splitter and said second dichroic filter.

196(canceled). The system of claim 189 wherein said polarization converter further includes a stack of polarizing beam splitters, said dichroic filters are adjacent to one another and are located on one side of said stack of beam splitters, and said polarization converter

further comprising a plurality of quarter waveplate and mirror stacks located on the other side of said stack of polarizing beam splitters, said dichroic filters and said quarter waveplate and mirror stacks arranged so that at least a portion of one of said dichroic filters opposes a portion of one of said quarter waveplate and mirror stacks, and at least a portion of another of said dichroic filters does not oppose any of said quarter wave plate and mirror stacks.

197(pending). The system of claim 181 wherein said light source produces light having three light components and said polarization converter separates said light so that two of said light components have the same polarization, which is different than the polarization of the third light component.

198(pending). The system of claim 197 wherein said three light components are blue, green, and red and said blue component and said green component have the same polarization, which is different than the polarization of said red component.

199(pending). The system of claim 181 wherein said polarization converter separates said two light components so that one of said components has s-polarization and the other light component has p-polarization.

200(canceled). A method of converting light comprising:

- (a) producing a light beam of generally white light that is nonpolarized and has at least two light components;

- (b) separating said generally white light beam into at least one light component polarized differently than another light component, wherein substantially all of said generally white light beam is transmitted as a single beam, wherein said one light component and said another light component are within a single said light beam, and said one light component has a different color than said another light component; and
- (c) separating said single beam into at least two light beams, where the first beam includes light having a first polarization and the second beam includes light having a second polarization, and providing light-component-specific images.

201(canceled). The method of claim 200 wherein said light beam is first separated into a first polarized component having a first polarization and a second polarized component having a second polarization.

202(canceled). The method of claim 201, further comprising the step of separating the first polarized component into a first light component and a second light component and changing the polarization of the first light component, and the step of separating the second polarized component spectrally into said first light component and said second light component and changing the polarization of the second light component, so that said first light component has said second polarization, and said second light component has said first polarization.

203(canceled). The method of claim 200 wherein said light beam is comprised of a red component, a blue component and a green component, and said light is separated so that said blue component and said green component have the same polarization, which is different than the polarization of said red component.

204(canceled). The method of claim 200 wherein said light beam is separated so that one of said light components has s-polarization and the other light component has p-polarization.

205(pending). A projection display system using polarized light comprising:

- (a) a light source for generating a generally white light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components, and said at least two components are provided to a projection system as a single beam, wherein the one light component and the other light component are within a single light beam, and said one light component has a different color than said other light component;
- (b) said projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, each LCD



panel generating a light-component-specific image associated with one of said light components; and

- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs.

206(pending). The system of claim 205 wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering and light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

207(pending). The system of claim 205 wherein said light source includes a polarization converter for pre-filtering said light beam.

208(canceled). The system of claim 205 wherein said polarizing beam splitters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are normal to said polarizing beam splitters and arranged to intersect adjacent a mid-point of said substantially straight lines.

209(canceled). The system of claim 208 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said

light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

210(canceled). The system of claim 208 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on a LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-transmitting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

211(pending). The system of claim 205 wherein said light source includes a lamp for generating said light beam and a pre-filtering illumination mechanism located between said lamp and said projection system for pre-filtering and said light beam to provide a red p-polarized light component to said projection system, wherein said pre-filtering illuminating mechanism includes:

a red-transmitting dichroic filter, a pair of polarizing beam splitters, a pair of light absorbing stops, a half-wave plate, and red-reflecting dichroic filter;

wherein said light beam impinges on red-transmitting dichroic filter, wherein said light beam is split into a reflected red light component and transmitted green light and blue light

components; said reflected green and blue light components impinge on a polarizing beam splitter, which reflects a green s-polarized light component and said blue light component, wherein said green s-polarized light component and said blue light component impinge said red-reflecting dichroic filter, which transmits said green s-polarized light component and a blue s-polarized light component to said projection system; and

wherein said reflected red light component impinges another polarizing beam splitter, which transmits a red-s-polarized light component through said half-wave plate, which changes said red s-polarized light component to a red p-polarized light component, which red p-polarized light component impinges said red-reflecting dichroic filter and is reflected to said projection system.

212(pending). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having at least three light components, wherein one of said light components is s-polarized and two of said light components are p-polarized.
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects one of said light components and transmits another of said light components and LCD panels, each LCD panel generating a light-component-specific image associated with each light component, wherein said polarizing beam splitters and said dichroic filters are arranged in a substantially X-shaped configuration, wherein said dichroic filters are

normal to said polarizing beam splitters and arranged to intersect adjacent an edge thereof; and

- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs.

213(pending). The system of claim 212 wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam.

214(pending). The system of claim 212 wherein said light source includes a polarization converter for pre-filtering said light beam.

215(pending). The system of claim 212 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

216(pending). The system of claim 212 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a

polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

217(pending). A projection display system using polarized light, comprising:

- (a) a light source for generating a generally white light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components, and said at least two light components are provided to a projection system as a single beam;
- (b) said projection system having a plurality of polarized light modulators, each modulator generating a light-component-specific image associated with one of said light components; and
- (c) a projection lens for projecting an image combined from the light-component-specific images from said modulators.

218(pending). The system of claim 217 wherein said light source includes a lamp and filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

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219(pending). The system of claim 217 wherein said light source includes a polarization converter.

220(canceled). The system of claim 219 wherein said polarization converter transmits substantially all of said light beam.

221(pending). The system of claim 219 wherein said light source has a lamp defining an initial étendue, and said polarization converter has an étendue no greater than twice said initial étendue.

222(canceled). The system of claim 219 wherein said polarization converter has a first dichroic filter and a second filter complimentary to said first dichroic filter, and wherein each dichroic filter is sandwiched between two quarter wave plates.

223(pending). The system of claim 219 wherein said polarization converter includes two polarizing beam splitters.

224(canceled). The system of claim 219 wherein said polarization converter further comprises a plurality of light input ports.

225(pending). The system of claim ~~222~~ 217 wherein said polarization converter further includes at least two polarizing beam splitter.

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226(pending). The system of claim 219 wherein said light source produces light having three light components and said polarization converter separates said light so that two of said light components have the same polarization, which is different than the polarization of the third light component.

227(pending). The system of claim 226 wherein said three light components are blue, green and red and said blue component and said green component have the same polarization, which is different than the polarization of said red component.

228(pending). The system of claim 219 wherein said polarization converter separates said two light components so that one of said light components has s-polarization and another of said light components has p-polarization.

229(canceled). A polarization converter for use with a light source that generates a light beam having at least two light components, comprising an optics array capable of separating said light beam into at least one light component polarized differently than another light component, wherein said one light component and said another light component are within a single said light beam and said one light component has a different color than said another light component, wherein said optics array has a first dichroic filter and a second dichroic filter complimentary to said first dichroic filter, wherein said optics array includes a polarizing beam splitter and said light beam passes through said beam splitter before passing through one of said dichroic filters.

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230(canceled). The converter of claim 229 wherein said optics array further includes another polarizing beam splitter.

231(canceled). The converter of claim 229 wherein said optics array further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

232(canceled). The converter of claim 231 wherein said optics array further includes another polarizing beam splitter.

233(canceled). The converter of claim 230 wherein said optics array further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

234(canceled). The converter of claim 233 wherein said optics array further includes a halfwave plate between one of said polarizing beam splitters and an illuminated object.

235(canceled). The converter of claim 233 wherein said optics array further includes a first polarizing beam splitter between said light source and said first dichroic filter, and a second polarizing beam splitter between said first polarizing beam splitter and said second dichroic filter.



236(canceled). The converter of claim 230 wherein said optics array further includes a stack of polarizing beam splitters, said dichroic filters are adjacent to one another and are located on one side of said stack of beam splitters, and said optics array further comprising a plurality of quarter waveplate and mirror stacks located on the other side of said stack of polarizing beam splitters, and said dichroic filters and said quarter waveplate and mirror stacks arranged so that at least a portion of one of said dichroic filters opposes a portion of one of said quarter waveplate and mirror stacks, and at least a portion of another of said dichroic filters does not oppose any of said quarter wave plate and mirror stacks.

237(canceled). A method for converting light comprising:

- (a) producing a light beam that is nonpolarized and has at least two light components;
- (b) separating said light beam into at least one light component polarized differently than another light component said one light component having a color that is different than said another light component, wherein substantially all of said light beam is transmitted;
- (c) wherein said light beam is first separated into a first polarized component having a first polarization and a second polarized component having a second polarization; and
- (d) wherein said light source defines an initial étendue and said optics array has an étendue substantially greater than one times said initial étendue.

238(canceled). The method of claim 237, further comprising the step of separating the first polarized component into a first light component and a second light component and changing the polarization of the first light component, and the step of separating the second polarized component spectrally into said first light component and said second light component and changing the polarization of the second light component, so that said first light component has said second polarization, and said second light component has said first polarization.

239(canceled). The system of claim 237 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

240(canceled). The system of claim 237 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-transmitting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

241(canceled). The system of claim 240 wherein said polarization converter further includes at least two polarizing beam splitters.

242(pending). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components;
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, each LCD panel generating a light-component-specific image associated with one of said light components;
- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs; and
- (d) wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

243(canceled). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components;
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, each LCD panel generating a light-component-specific image associated with one of said light components;
- (c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs; and
- (d) said polarizing beam splitters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are arranged in a substantially straight line in said projection system, and wherein said dichroic filters are normal to said polarizing beam splitters and arranged to intersect adjacent a mid-point of said substantially straight lines.

244(canceled). The system of claim 243 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected

therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-reflecting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

245(canceled). The system of claim 243 wherein said light beam from said light source impinges on a blue-transmitting dichroic filter at substantially 45 degrees, then impinges on a polarizing beam splitter at substantially 45 degrees, then impinges on an LCD panel having said light-component-specific image displayed thereon, substantially normal thereto, and is reflected therefrom carrying a color image component, then impinges a polarizing beam splitter at substantially 45 degrees, then impinges a blue-transmitting dichroic filter at substantially 45 degrees prior to transmitting said projection lens.

246(pending). A projection display system using polarized light comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components;
- (b) a projection system having plural polarizing beam splitters and dichroic filters therein, wherein each polarizing beam splitter and dichroic filter reflects at least one of said light components and transmits at least another of said light components and a plurality of LCD panels, each LCD

panel generating a light-component-specific image associated with one of said light components;

(c) a projection lens for projecting an image combined from the light-component-specific images from the LCDs; and

(d) wherein said light source includes a lamp for generating said light beam and a pre-filtering illumination mechanism located between said lamp and said projection system for pre-filtering said light beam to provide a red p-polarized light component to said projection system, wherein said pre-filtering illuminating mechanism includes:

a red-transmitting dichroic filter, a pair of polarizing beam splitters, a pair of light absorbing stops, a half-wave plate, and a red-reflecting dichroic filter;

wherein said light beam impinges said red-transmitting dichroic filter, wherein said light beam is split into a reflected red light component and transmitted green light and blue light components; said reflected green and blue light components impinge on a polarizing beam splitter, which reflects a green s-polarized light component and said blue light component, wherein said green s-polarized light component and said blue light component impinge said red-reflecting dichroic filter, which transmits said green s-polarized light component and a blue s-polarized light component to said projection system; and

wherein said reflected red light component impinges another polarizing beam splitter, which transmits a red s-polarized light component through said half-wave plate, which changes said red s-polarized light component to a red p-polarized light component, which

red p-polarized light component impinges said red-reflecting dichroic filter and is reflected to said projection system.

247(pending). A projection display system using polarized light, comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least one of said light components is polarized differently than another of said light components;
- (b) a projection system having a plurality of polarized light modulators, each modulator generating a light-component-specific image associated with one of said light components;
- (c) a projection lens for projecting an image combined from the light-component-specific images from said modulators; and
- (d) wherein said light source includes a lamp and a filter stack having a cholesteric color filter mechanism located between said lamp and said projection system for pre-filtering said light beam to transmit red p-polarized light, green s-polarized light and blue s-polarized light.

248(pending). A projection display system using polarized light, comprising:

- (a) a light source for generating a light beam having at least two light components, wherein said light components are polarized and at least

one of said light components is polarized differently than another of said light components;

- (b) a projection system having a plurality of polarized light modulators, each modulator generating a light-component-specific image associated with one of said light components;
- (c) a projection lens for projecting an image combined from the light-component-specific images from said modulators; and
- (d) wherein said light source includes a polarization converter, and wherein said polarization converter has a first dichroic filter and a second filter complimentary to said first dichroic filter, and wherein each dichroic filter is sandwiched between two quarter waveplates.

249(pending). A polarization converter for use with a light source that generates a light beam having at least two light components, comprising an optics array capable of separating said light beam into at least one light component polarized differently than another light component wherein said one light component and another light component are within a single light beam, and wherein said one light component has a different color than said another light component, and wherein said light source defines an initial étendue and said optics array has an étendue of no more than four times greater than said initial étendue.

250(pending). The converter of claim 249 wherein said optics array has an étendue no more than 3.5 times greater than said initial étendue.



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251(pending). The converter of claim 249 wherein said optics array has an étendue no more than two times greater than said initial étendue.

252(canceled). The converter of claim 249 wherein substantially all of said light beam is transmitted through said optics array.

253(canceled). The converter of claim 249 wherein said optics array has at least one dichroic filter, and wherein said dichroic filter is sandwiched between two quarter waveplates.

254(canceled). The converter of claim 249 wherein said optics array has a first dichroic filter and a second dichroic filter complementary to said first dichroic filter.

255(canceled). The converter of claim 254 wherein each dichroic filter is sandwiched between two quarter waveplates.

256(canceled). The converter of claim 254 wherein said optics array includes a polarizing beam splitter and said light beam passes through said beam splitter before passing through one of said dichroic filters.

257(canceled). The converter of claim 256 wherein said optics array further includes another polarizing beam splitter.

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258(canceled). The convert of claim 255 wherein said optics array further includes two polarizing beam splitters and each of said dichroic filters is between each of said beam splitters.

259(canceled). The converter of claim 258 wherein said optics array further includes a half waveplate between one of said polarizing beam splitters and an illuminated object.

260(canceled). The converter of claim 255 wherein said optics array further includes a first polarizing beam splitter between said light source and said first dichroic filter, and a second polarizing beam splitter between said first polarizing beam splitter and said second dichroic filter.

261(canceled). The converter of claim 255 wherein said optics array further includes a stack of polarizing beam splitters, said dichroic filters are adjacent to one another and are located on one side of said stack of beam splitters, and said optics array further comprising a plurality of quarter waveplate and mirror stacks located on the other side of said stack of polarizing beam splitters, said dichroic filters and said quarter waveplate and mirror stacks arranged so that at least a portion of one of said dichroic filters opposes a portion of one of said quarter waveplate and mirror stacks, and at least a portion of another of said dichroic filters does not oppose any of said quarter waveplate and mirror stacks.

262(pending). A method of converting light comprising:

- (a) producing a light beam that is nonpolarized and has at least two light components;
- (b) separating said light beam into at least one light component polarized differently than another light component, said one light component having a color that is different than said another light component, wherein substantially all of said light beam is transmitted; and
- (c) wherein said light beam is first separated into a first polarized component having a first polarization and a second polarized component having a second polarization; and wherein the first polarized component is separated into a first light component and a second light component and the polarization of said first light component is changed; and wherein said second polarized component is separated spectrally into said first light component and said second light component and the polarization of said second light component is changed, so that said first light component has said second polarization, and said second light component has said first polarization.